NTE ELECTRONICS, INC.
44 FARRAND STREET
BLOOMFIELD, NJ 07003
(973) 748–5089

NTE864
Integrated Circuit
Precision Waveform Generator

Description:

The NTE864 is a precision waveform generator in a 14–Lead DIP type package capable of producing sine, square, triangular, sawtooth and pulse waveform. Its operating frequency can be selected over eight decades of frequency, from 0.001Hz to 200kHz. The frequency of oscillation is highly stable over a wide range of temperature and supply voltage changes. Both full frequency sweeping as well as smaller frequency variations (FM) can be accomplished with an external control voltage. Each of the three basic waveforms, i.e., sinewave, triangle and square wave outputs are available simultaneously, from independent output terminals.

Applications:

- Precision Waveform Generation: Sine, Triangle, Square, Pulse
- Sweep and FM Generation
- Tone Generation
- Instrumentation and Test Equipment Design
- Precision PLL Design

Absolute Maximum Ratings:

Power Supply Voltage, V_{CC} 36V
Power Dissipation, P_D 625mW
Derate Above +25°C . . . . 5mW/°C
Storage Temperature Range, T_{stg} . . . . –65° to +150°C
Operating Temperature Range, T_{opr} . . . . 0° to +70°C

System Description:

The NTE864 precision waveform generator produces highly stable and sweepable square, triangle, and sine waves across eight frequency decades. The device time base employs resistors and a capacitor for frequency and duty cycle determination. The generator contains dual comparators, a flip–flop driving a switch, current sources, buffers, and a sine wave converter. Three identical frequency waveforms are simultaneously available. Supply voltage can range from 10V to 30V, or ±5V to ±15V with dual supplies.

Unadjusted sine wave distortion is typically less than 0.7%, with Pin1 open and 82kΩ from Pin12 to Pin11 (–V or GND). Sine wave distortion may be improved by including two 100kΩ potentiometers between V_{CC} and –V (or GND), with one wiper connected to Pin1 and the other connected to Pin12.

Small frequency deviation (FM) is accomplished by applying modulation voltage to Pin7 and Pin8; large frequency deviation (sweeping) is accomplished by applying voltage to Pin8 only. Sweep range is typically 1000:1.

System Description (Cont'd):

The square wave output is an open collector transistor; output amplitude swing closely approaches the supply voltage. Triangle output amplitude is typically 1/3 of the supply, and sine wave output reaches 0.22 of the supply voltage.

Electrical Characteristics: (V_S = ±5V to ±15V, T_A = +25°C, R_L = 1MΩ, R_A = R_B = 10kΩ, C_1 = 3300pF, S_1 closed, unless otherwise specified.)

Parameter	Test Conditions	Min	Typ	Max	Unit
General Characteristics					
Supply Voltage, V_S Single Supply		10	–	30	V
Dual Supplies		±5	–	±15	V
Supply Current	V_S = ±10V, Note 1	–	12	15	mA
Frequency Characteristics (Measured at Pin9)					
Range of Adjustment Max. Operatring Frequency	R_A = R_B = 1.5kΩ, C_1 = 680pF, R_L = 10kΩ	200	–	–	kHz
Lowest Practical Frequency	R_A = R_B = 1MΩ, C_1 = 500µF, (Low Leakage Cap)	–	0.001	–	Hz
Max. Sweep Frequency of FM Input		–	100	–	kHz
FM Sweep Range	S_1 Open, Note 2, Note 3	–	1000:1	–	–
FM Linearity 10:1 Ratio	S_1 Open, Note 3	–	0.1	–	%
Range of Timing Resistors	Values of R_A and R_B	0.5	–	1000	kΩ
Temperature Stability		–	50	100	ppm/°C
Power Supply Stability	Note 4	–	0.05	–	%/V
Output Characteristics					
Square Wave (Pin9) Amplitude (Peak–to–Peak)	R_L = 100kΩ	0.9	0.98	–	x V_{SPLY}
Saturation Voltage	I_{SINK} = 2mA	–	0.2	0.4	V
Rise Time	R_L = 4.7kΩ	–	100	–	ns
Fall Time	R_L = 4.7kΩ	–	40	–	ns
Duty Cycle Adjust		2	–	98	%
Triangle/Sawtooth/Ramp (Pin3) Amplitude (Peak–to–Peak)	R_L = 100kΩ	0.3	0.33	–	x V_{SPLY}
Linearity		–	0.05	–	%
Output Impedance	I_{OUT} = 5mA	–	200	–	Ω
Sine–Wave Distortion Amplitude (Peak–to–Peak)	R_L = 100kΩ	0.2	0.22	–	x V_{SPLY}
Unadjusted	R_L = 1MΩ, Note 5, Note 6	–	0.7	1.5	%
Adjusted		–	0.5	–	%

Note 1 Currents through R_A and R_B not included.
Note 2 V_{SUPPLY} = 20V
Note 3 Apply sweep voltage at Pin8. $V_{CC} - (1/3\ V_{SUPPLY} - 2) \leq V_{PIN8} \leq V_{CC}$, V_{SUPPLY} = Total Supply Voltage across the IC
Note 4 10V ≤ V_S ≤ 30V or ±5V ≤ V_S ≤ ±15V.
Note 5 82kΩ resistor connected between Pin11 and Pin12.
Note 6 Triangle duty cycle set at 50%, use R_A and R_B.
Note 7 As R_L is decreased distortion will increase, R_L min. ≅ 50kΩ.

Pin Connection Diagram